

Annex B - NWIFCA Mussel Inspections and Surveys June-July 2021

a) Duddon Estuary Mussel Inspection 27/06/21

LW: 08:27 1.0m (Liverpool tides)

The area of mussel identified in April was inspected to assess the growth, condition and coverage of the mussel. The area was accessed by quad bike, and carried out an inspection on foot. The area is in a main channel and even on a low water spring tide much of the area remains under water.

There was an area of mussel and bare cobble present in the channel. The extent of the bed has been mapped below showing the boundary that was walked by officers (Figures 1 and 2). The majority of the area remained under water during the inspection. However, the water was very clear which enabled officers to assess where the edge of the bed was.

A large proportion of the mussel furthest up the channel ranged in size from 35-45mm (Figure 3). This area covered approximately one quarter of the bed. Where the mussel remained underwater regular sample were taken to observe the mussel (Figure 4). Along the northern edge of the bed there was a dense covering of 15-20mm mussel amongst less dense 20-40mm mussel (Figure 5). Some areas of the mussel were covered in a thin layer of sand and there were large numbers of sand mason between the mussels (Figure 6). At the South Western area of the bed, the mussel was patchy and less dense than other areas of the bed, with larger patches of bare sand in between patches of mussel (Figure 7).

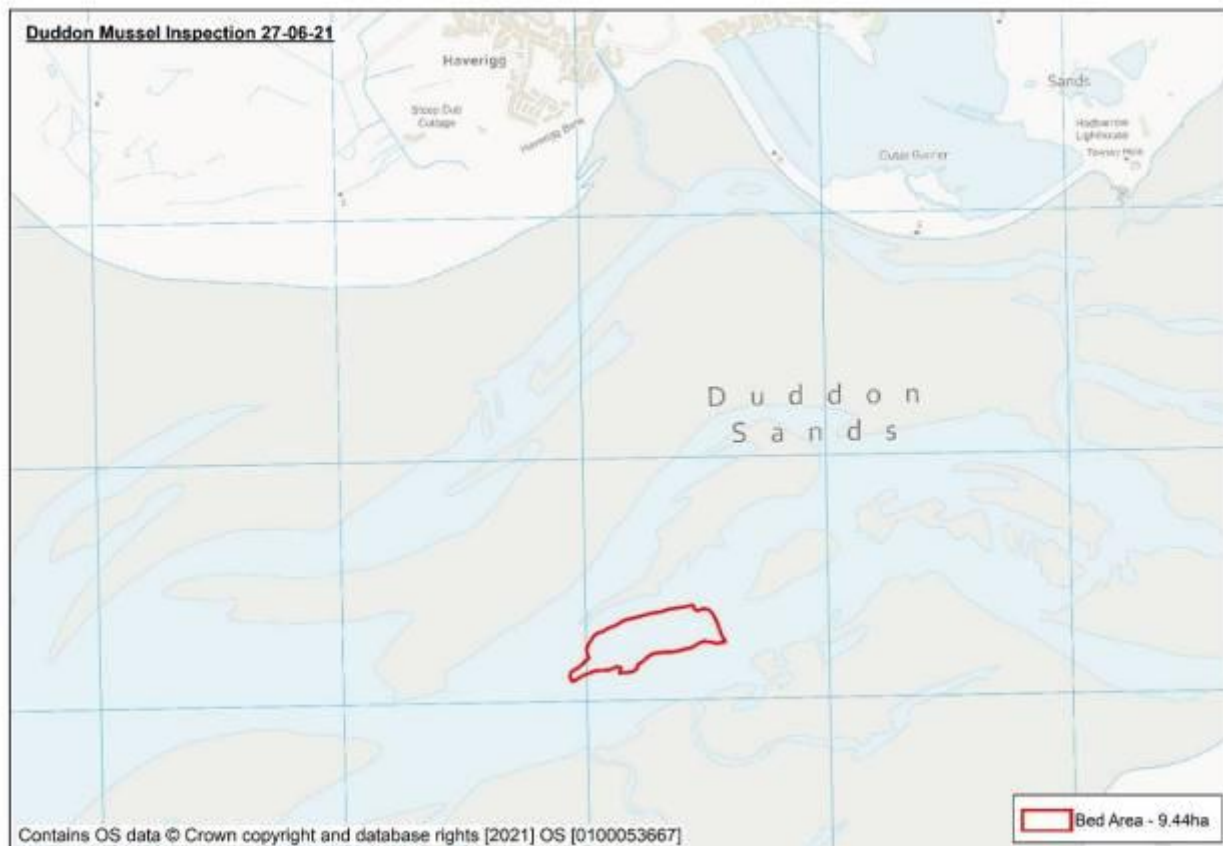


Fig 1 – Outline of mussel in the Duddon Channel 27-06-21

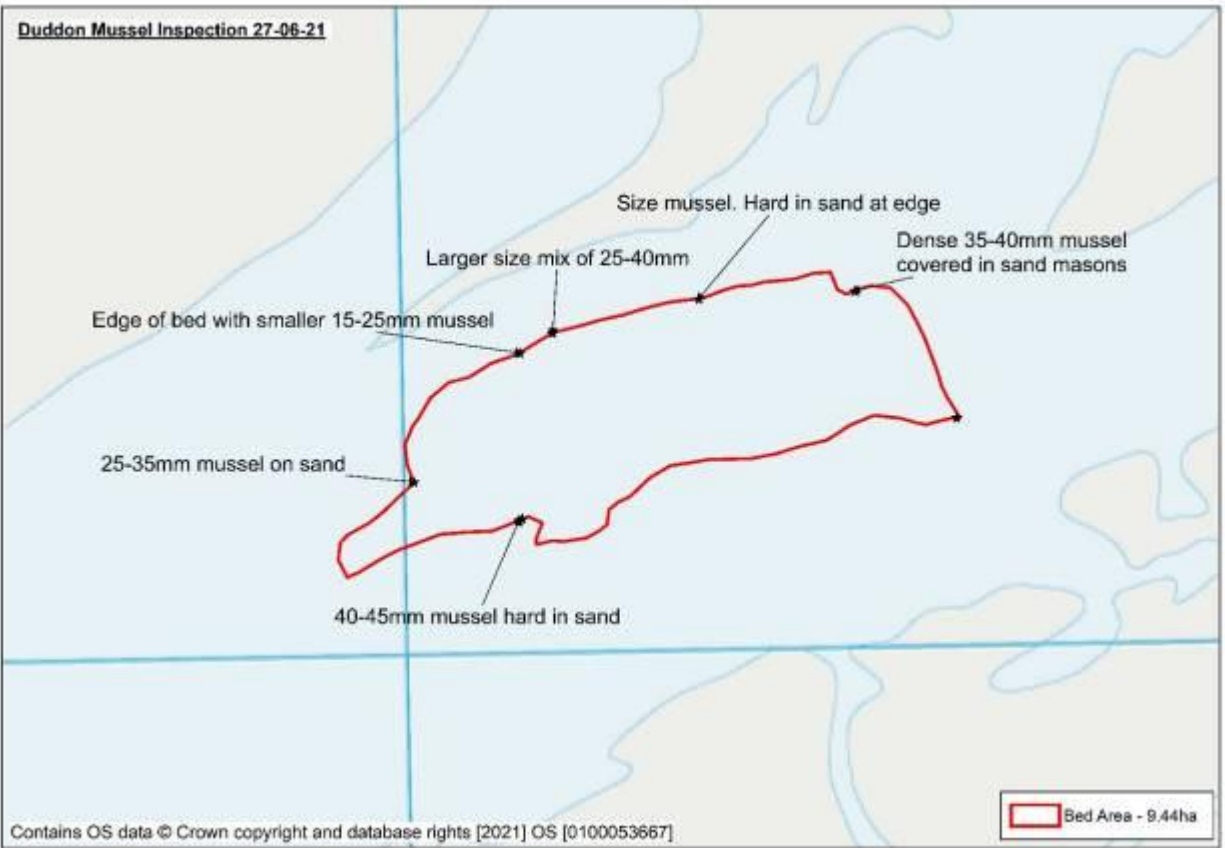


Fig 2 – Outline of bed Area, with labelled waypoints, for Duddon mussel inspection 27-06-21



Fig 3 – Dense patch of 35-45mm uncovered mussel 27-06-21



Fig 4 – Sample of 40-45mm mussel from an area which did not uncover 27-06-21



Fig 5 – Sample of 20-30mm mussel from an area which did not uncover 27-06-21



Fig 6 – Area of 35-45mm mussel mixed in with Sand Mason 27-06-21



Fig 7 – Patchy mussel at furthest point down the channel 27-06-21

b) Morecambe Bay Mussels

An update on mussel stock in Morecambe Bay was provided at the extraordinary TSB in June. Below is a update on mussel stocks since last reported.

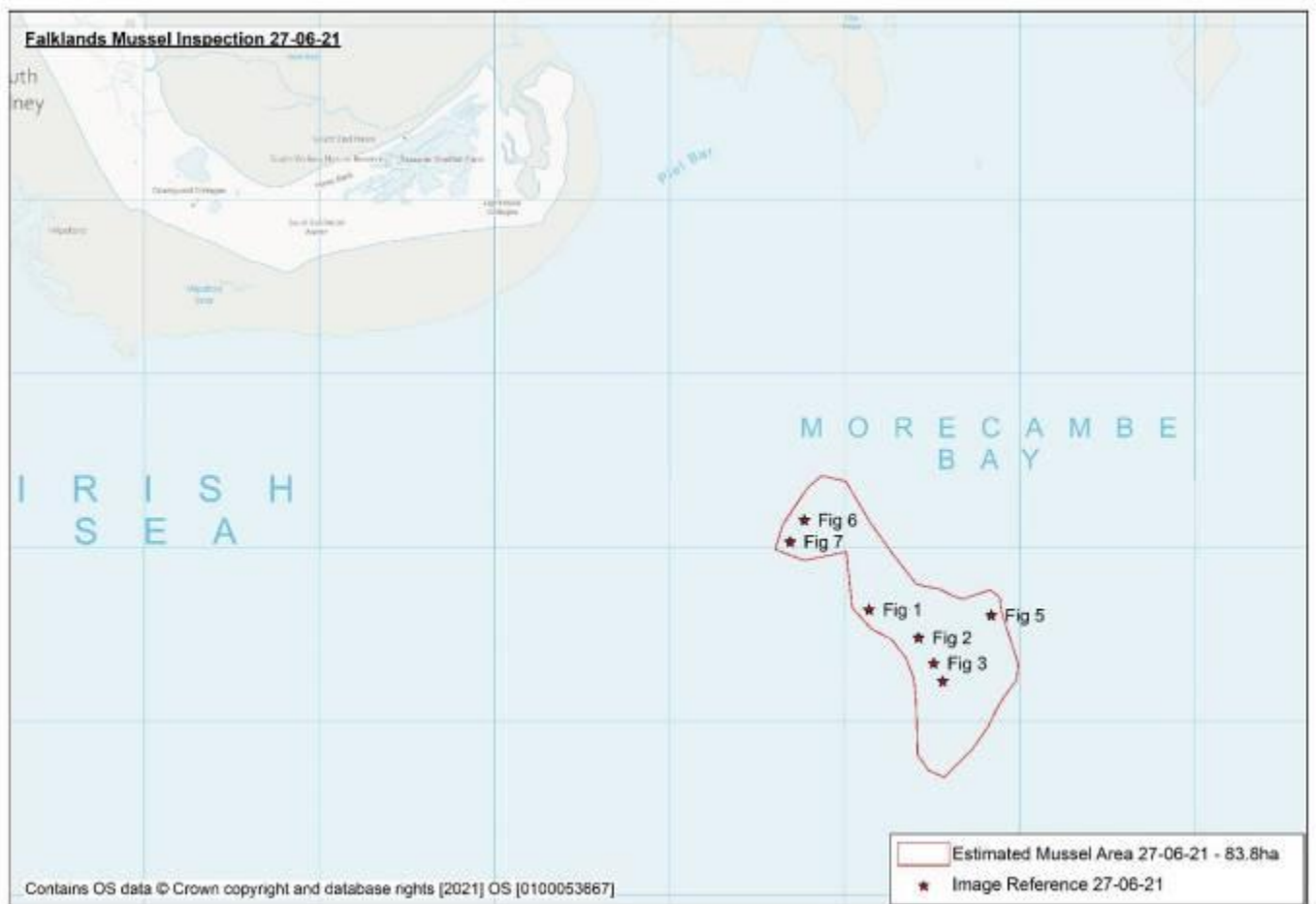
I. Heli flight Mussel Survey, Falklands 27-06-21

Low water: 08:27 1.0m (Liverpool Tides)

Survey method: Heli flight Visual Inspection

This report outlines the observations of mussel stock on the Falklands obtained from an industry Heli flight with an NWIFCA present. The area previously inspected and reported on has increase in size significantly with a lot more mussel present in the water. A rough estimated perimeter was obtained by flying around the area of mussel on Falklands (Figure 1), there should be some caution applied to the perimeter due to the accuracies of tracking the edge of a mussel bed which is submerged and patchy during a Heli flight. The area provided in the map is likely to be an over estimate.

The is a mix of density across the bed with a large area of dense 2021 mussel with some patchy areas in the water. The mussel was on a mix of sand a mud. The area of *Sabellaria alveolata* present in the survey in May was not identifiably and is most likely buried under and layer of mussel and sediment (sand / mud). There was no starfish witnessed across the bed.



Map of estimated area of mussel 27-06-21



Fig 1 – Falklands 2021, mussel extending into the water 27-06-21

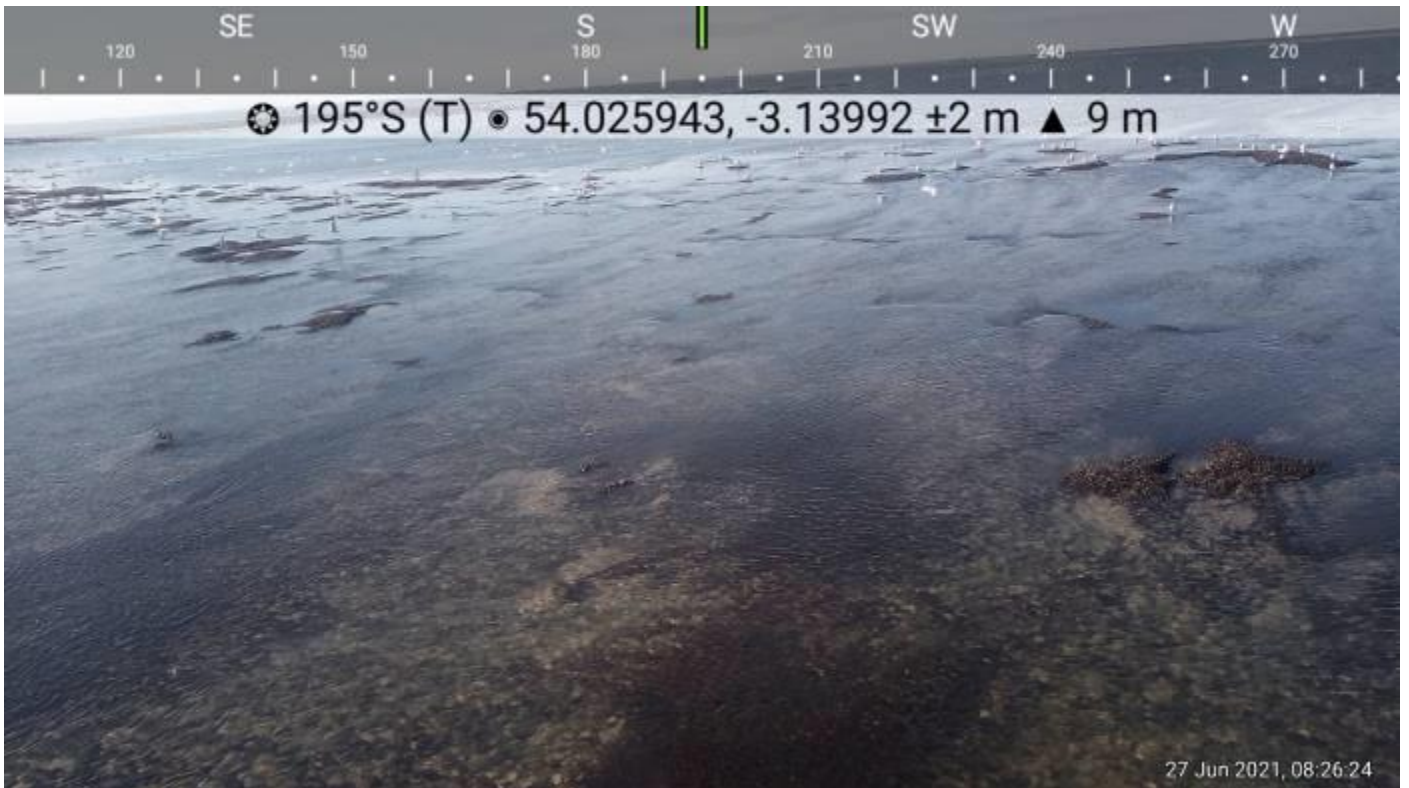


Fig 2 - Falklands 2021, mussel extending into the water 27-06-21

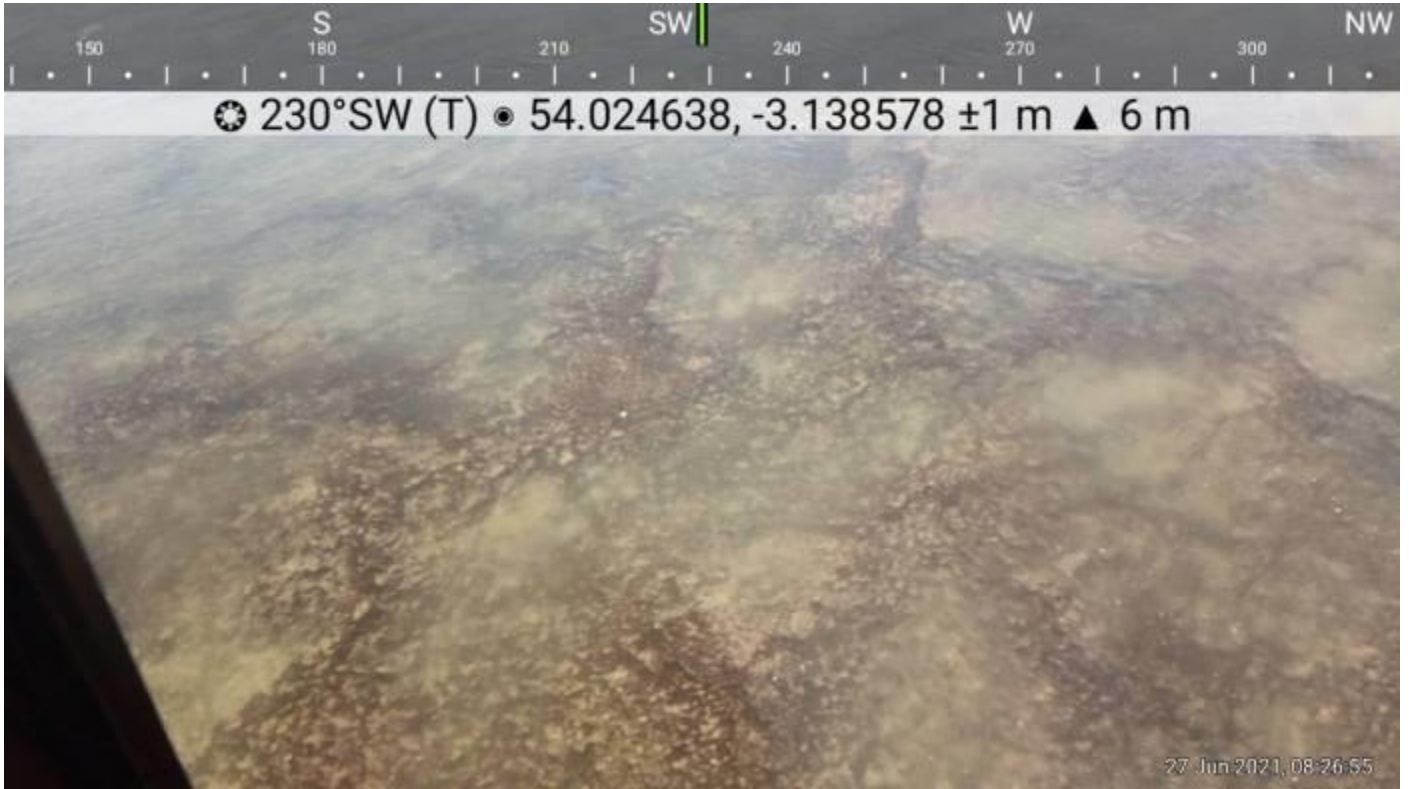


Fig 3 - Falklands 2021, mussel extending into the water 27-06-21



Fig 4 - Falklands 2021, mussel drying area 27-06-21



Fig 5 - Falklands 2021, mussel extending into the water 27-06-21

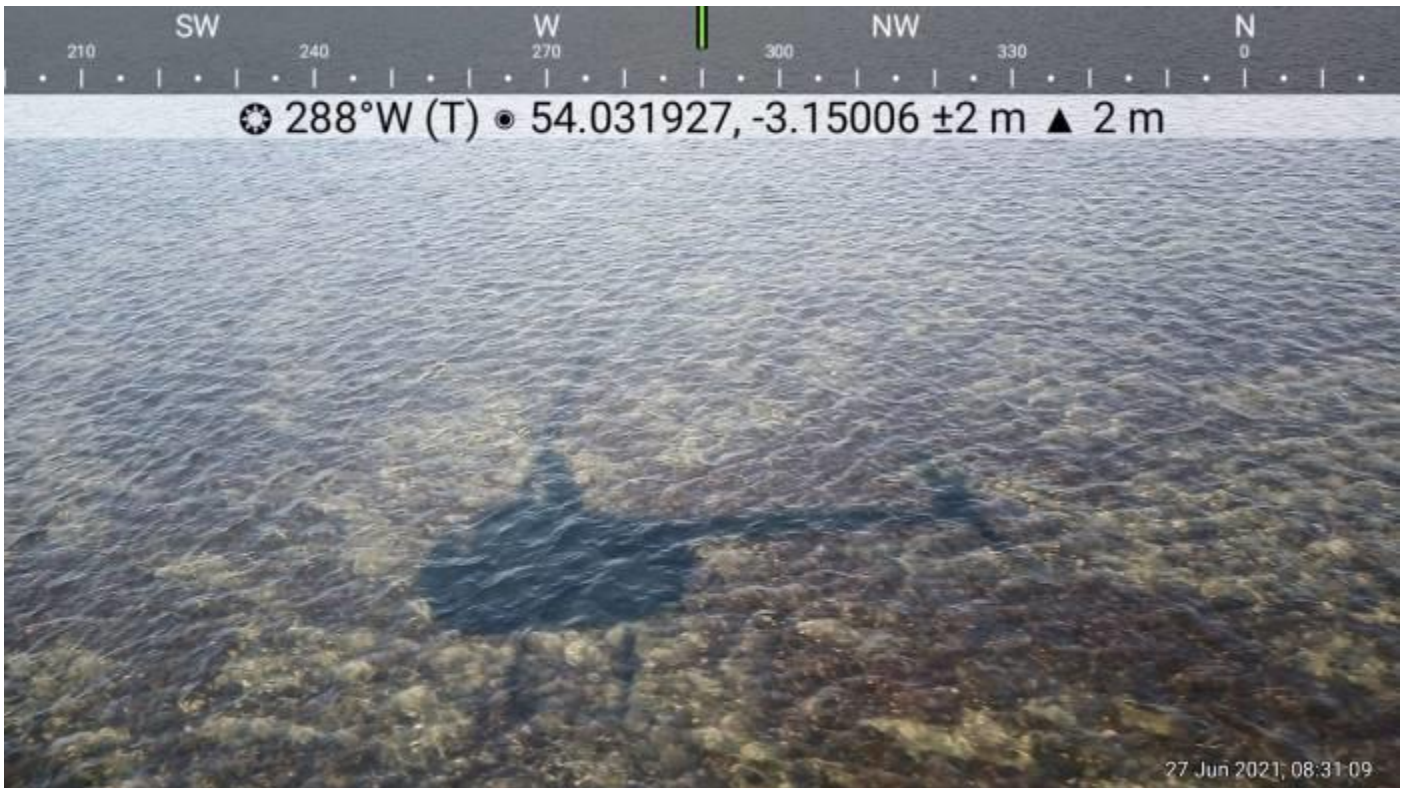


Fig 6 - Falklands 2021, mussel extending into the water 27-06-21



Fig 7 - Falklands 2021, mussel extending into the water 27-06-21

II. Falklands Mussel Inspection 25-07-21

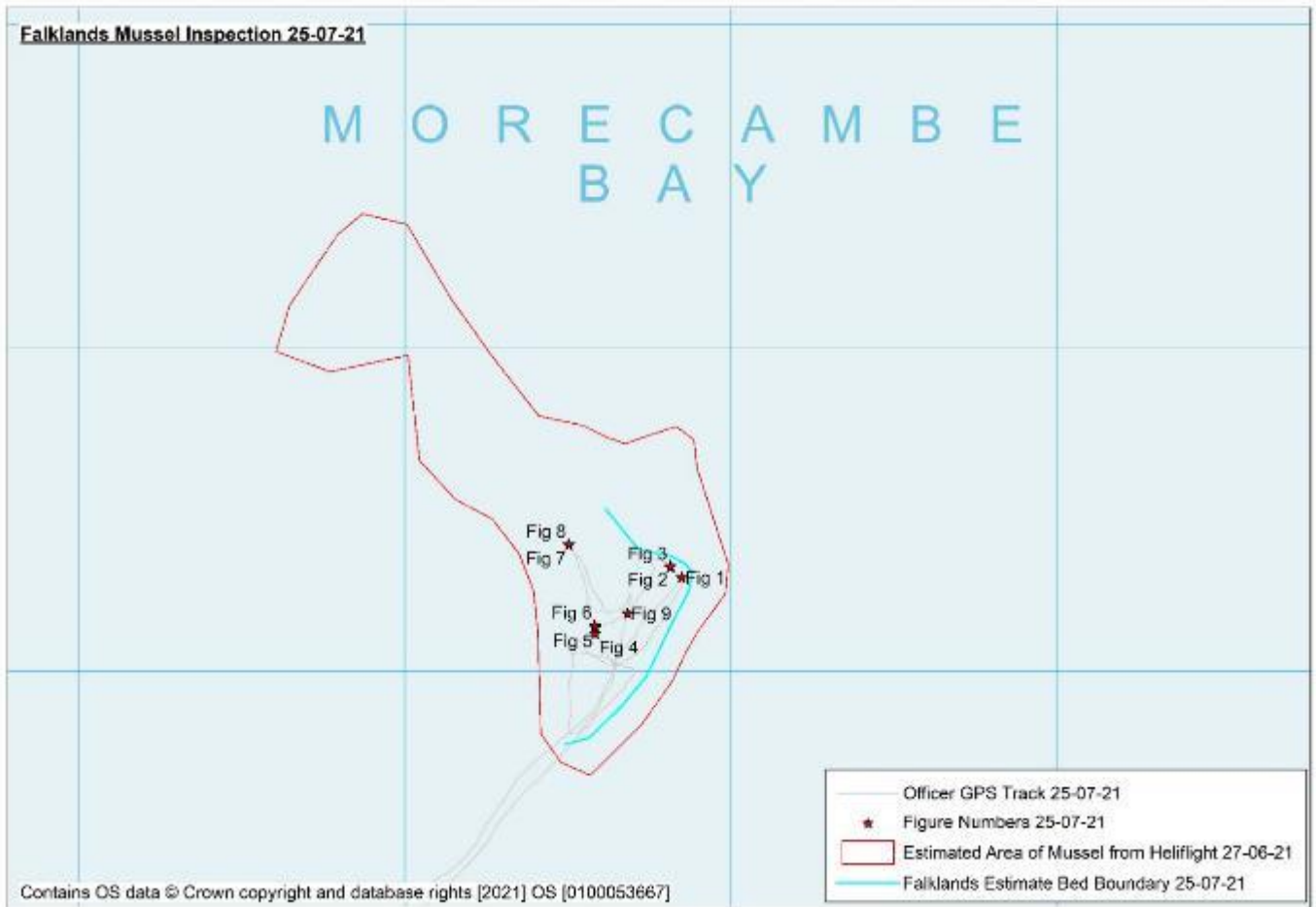
Low water: 07:30 1.0m (Liverpool Tides)

Survey method: Drying out NWIFCA RHIB

The area known as Falklands which has previously been reported on from the 2021 industry Heli flights was inspected to provide an update on the condition of the mussel to inform management of the potential mussel fishery. Officers dried the RHIB out and inspected the bed on foot. Only areas that had dried or were in shallow water could be inspected. The Northern extent of the bed was not inspected as access was not possible. Figure shows the previously estimated area calculated from the June Heli flight. A line showing the extent of the Eastern and Southern boundary has been provided as this could be easily estimated from the inspection.

The area is very mixed in mussel density and substrate. The mussel varies in density across the bed with areas of sparse mussel and areas of dense mussel. The Eastern side of the bed has reduced significantly in mussel density and coverage from that observed on the June Heli flight.

Much of the rest of the bed was a mix of denser mussel on the top of sand and depressions with exposed hard substrate and *sabellaria alveolata*. The exposed hard substrate was consistent across most of the area inspected. The *Sabellaria alveolata* was more concentrated South of figures 3 and 6 although present across most of the inspected area.



Map of estimated area of mussel 25-07-21



Fig 1 – Falklands 2021, sparse mussel coverage to the East of the bed 25-07-21



Fig 2 - Falklands 2021, example of bare cobble between patches of mussel. 25-07-21



Fig 3 - Falklands 2021, example of exposed Sabellaria alveolata. 25-07-21



Fig 4 - Falklands 2021, example of exposed hard ground and *Sabellaria alveolata*. 25-07-21

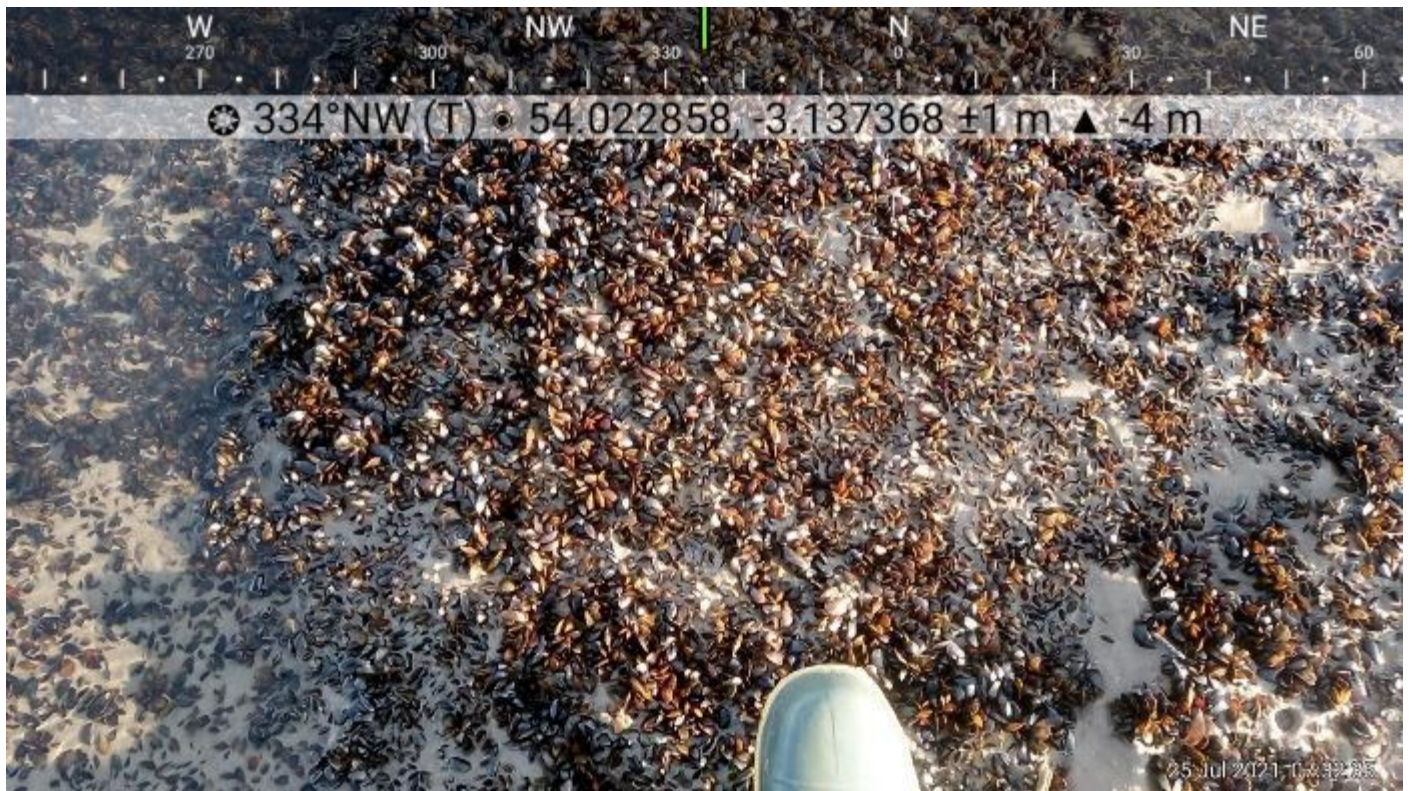


Fig 5 - Falklands 2021, area of dense mussel. 25-07-21



Fig 6 - Falklands 2021, area of mixed hard, *Sabellaria alveolata* and mussel. 25-07-21

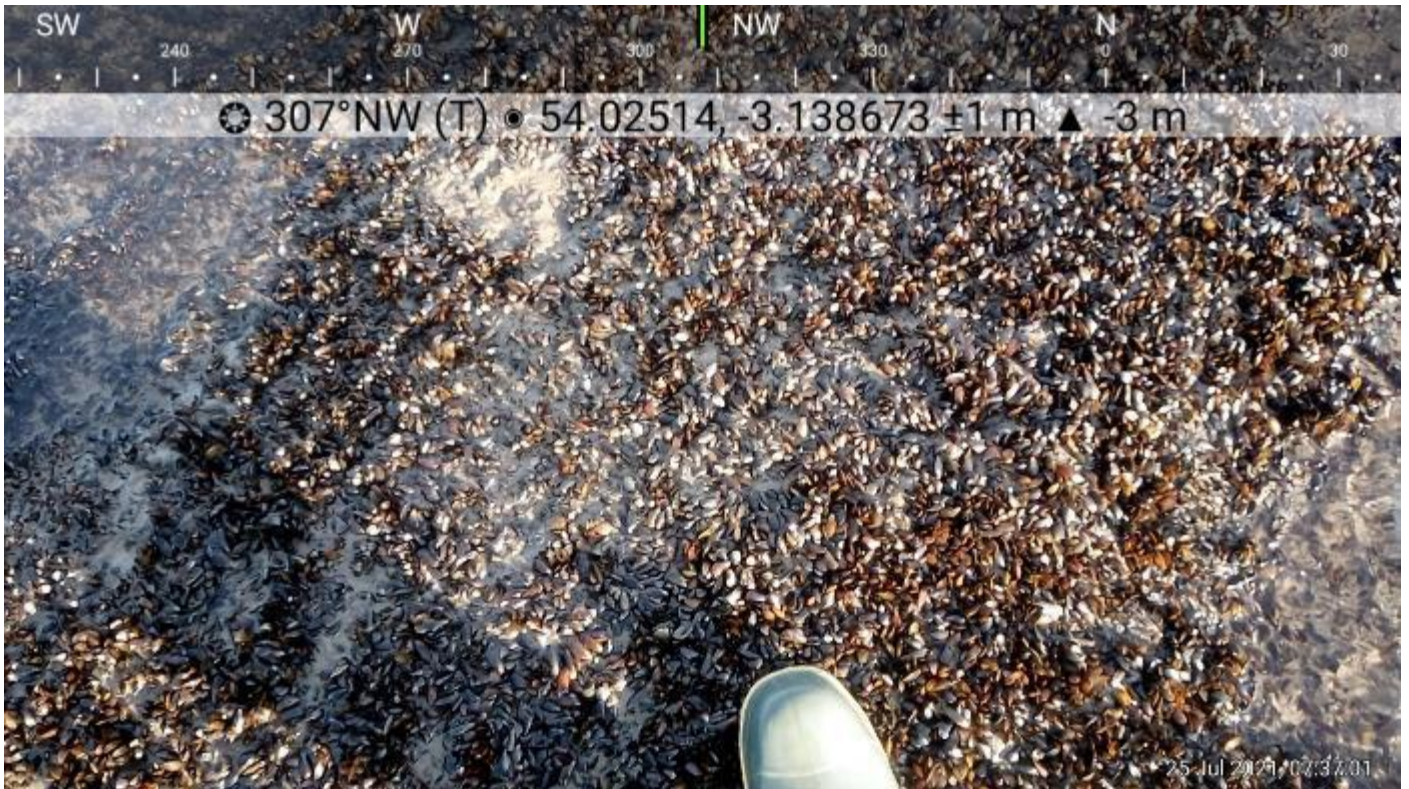


Fig 7 - Falklands 2021, area of dense mussel. 25-07-21

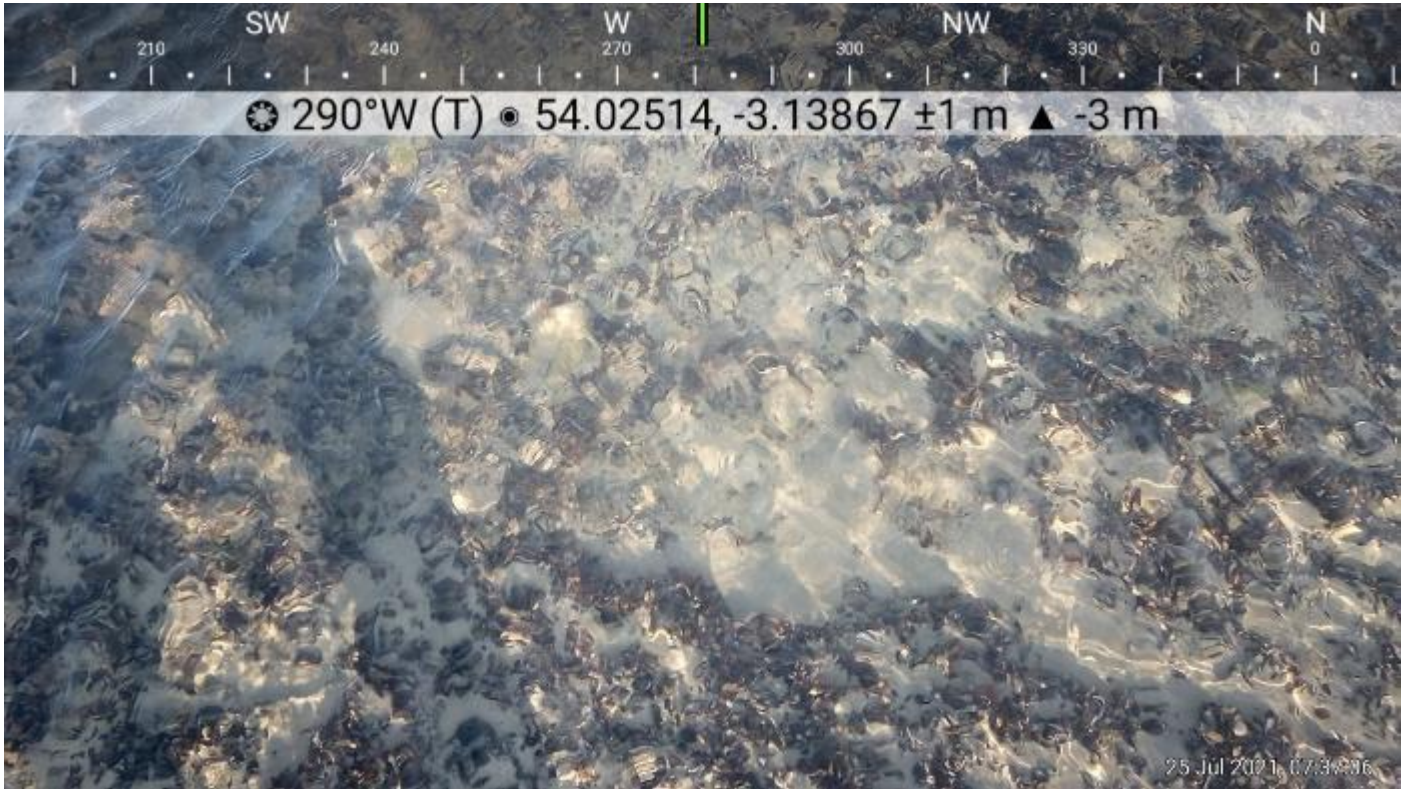


Fig 8 - Falklands 2021, area of patchy mussel on a thin layer of sand with some exposed hard ground. 25-07-21



Fig 9 – Overview of Falklands. 25-07-21

III. South America Mussel Inspection (Quad) 25/06/21

LW: 06:44 1.1m (Liverpool tides)

South America

The area of South America was inspected to monitor the condition of the mussel first observed in March 2021 and inspected in May 2021 and to assess if there had been any further mussel settlement. The area could not be assessed by quad bike as the ground leading to the South America had changed and the tide did not ebb as expected. This could have been due to weather and channel levels due to rainfall. The bed was accessed by foot and officers only had limited time due to the tide. Only the northern end of the bed was inspected before officers needed to leave. The bed looked to be of similar shape and size to previous inspections.

On the northern area of the bed, the mussel was made up of a majority of 15-20mm mussel with a small amount of 10-15mm mussel (Figures 1, 2 & 3). Larger mussel was not noted in this area of the bed. The mussel was very loose and sitting on top of loose sand. No mussel mud was noted. The mussel was patchier in distribution with larger areas of bare sand in between the mussel compared to the previous inspection on 27/05/21.



Fig 1 – Overview of mussel on the Northern End of South America 25-06-21



Fig 2 – Majority 15-20mm mussel with some 10-15mm on South America 25-06-21



Fig 3 – 15-20mm mussel on South America 25-06-21

IV. South America Mussel Inspection (Quad) 26/07/21

LW: 08:18 0.9m (Liverpool tides)

South America

The area of South America was inspected to monitor the condition of the mussel observed in June 2021 and to assess if there had been any further mussel mud development. South America was accessed by quad bike, and an inspection was carried out on foot. Figure 1 provide an estimated map of the area of mussel taken from May (quad inspection) and June (Heli flight).

The majority of mussel was 20-25mm with some smaller 15-20mm mixed in (Figure 3). Some areas had very small amounts of larger 45-50mm mussel in amongst the 20-25mm mussel (Figure 4). Over most of the bed, the mussel was sitting on a layer of muddy sand, with the mussel being very loose (Figure 5 and 6). In a couple of small areas, the 20-25mm mussel was hard in sand (Figure 7). Only 1 or 2 small areas of cobble were present on the bed, in between the peaks and banks of mussel sitting on sand. The largest banks of mussel on sand were approximately 30-40cm in height.

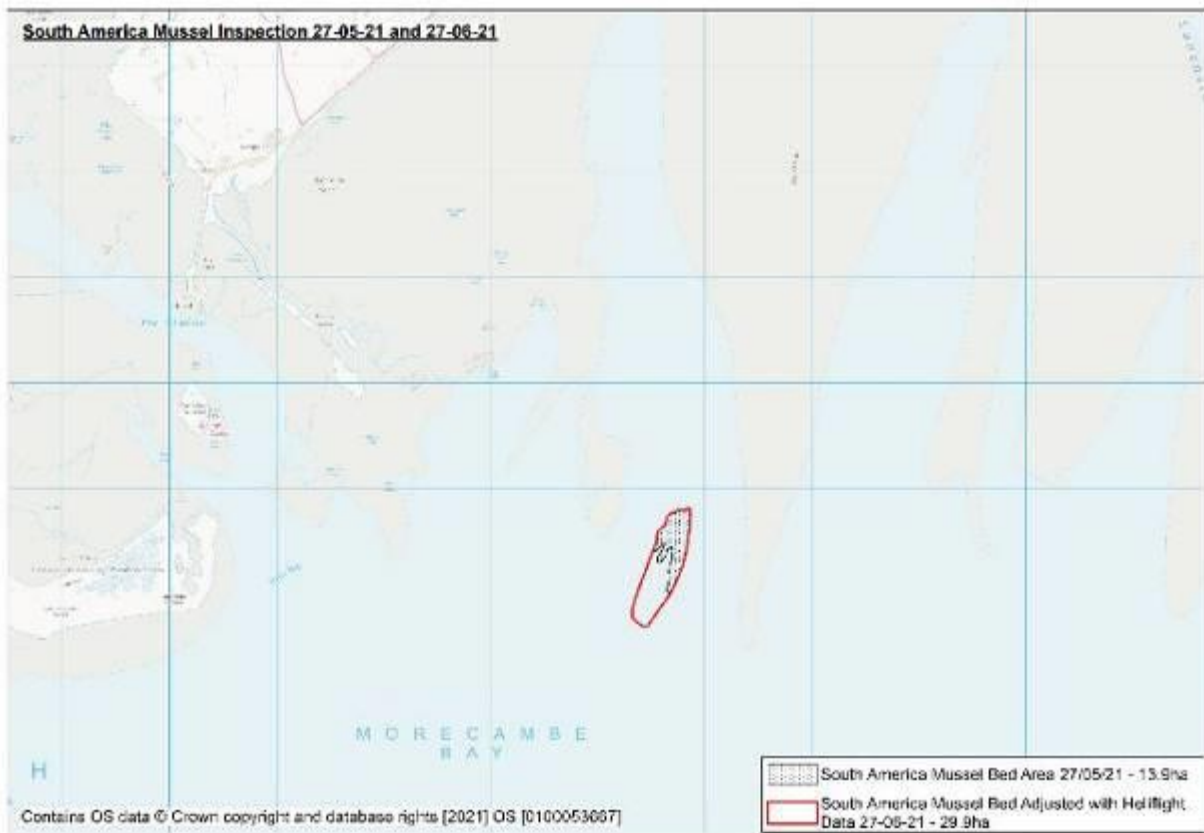


Fig 1. Overview of size of the South America from May and June inspection data



Fig 2. Overview of mussel on South America 26-07-21



Fig 3. 20-25mm mussel with some 15-20mm mussel on South America 26-07-21



Fig 4. 45-50mm mussel mixed in with 20-25mm mussel on South America 26-07-21



Fig 5. 20-25mm mussel sitting on muddy sand on South America 26-07-21



Fig 6. 20-25mm mussel sitting on muddy sand on South America 26-07-21



Fig 7. 20-25mm mussel hard in sand on South America 26-07-21

V. Heysham Flat Mussel and *Sabellaria alveolata* Inspection 25-06-21

Tides LW 06:44 1.1m (Liverpool tides)

The skear was accessed on foot to inspect the mussel on Heysham Flat (Figure 1) to assess the mussel settlement since it was last inspected at the end of May, when there was evidence of a settlement. It was previously reported much of the end of the skear from Conger Rock to Dallam Dyke is covered in *Sabellaria alveolata*. However the *Sabellaria alveolata* reef has been covered by an extensive mussel settlement, the mussel has already started putting down mussel mud, completely covering the reef (Figure 2). The coverage of *Sabellaria alveolata* visible has drastically reduced and is now confined to the Northern and Southern edges of the main skear.

The mussel was constant across the majority of the main skear. The mussel had a dense coverage of 70-100% at a size of 10-20mm, with some smaller mussel of 8-10mm closer to shore (Figures 3 and 5). On the edges of the *Sabellaria alveolata* it was evident that the mussel had settled on it (Figure 4). There were occasional patches of 20-30mm mussel mixed in with the seed.

Dallam Dyke was not crossed but the further skears appeared black in colouration so it is assumed that seed settlement has occurred.

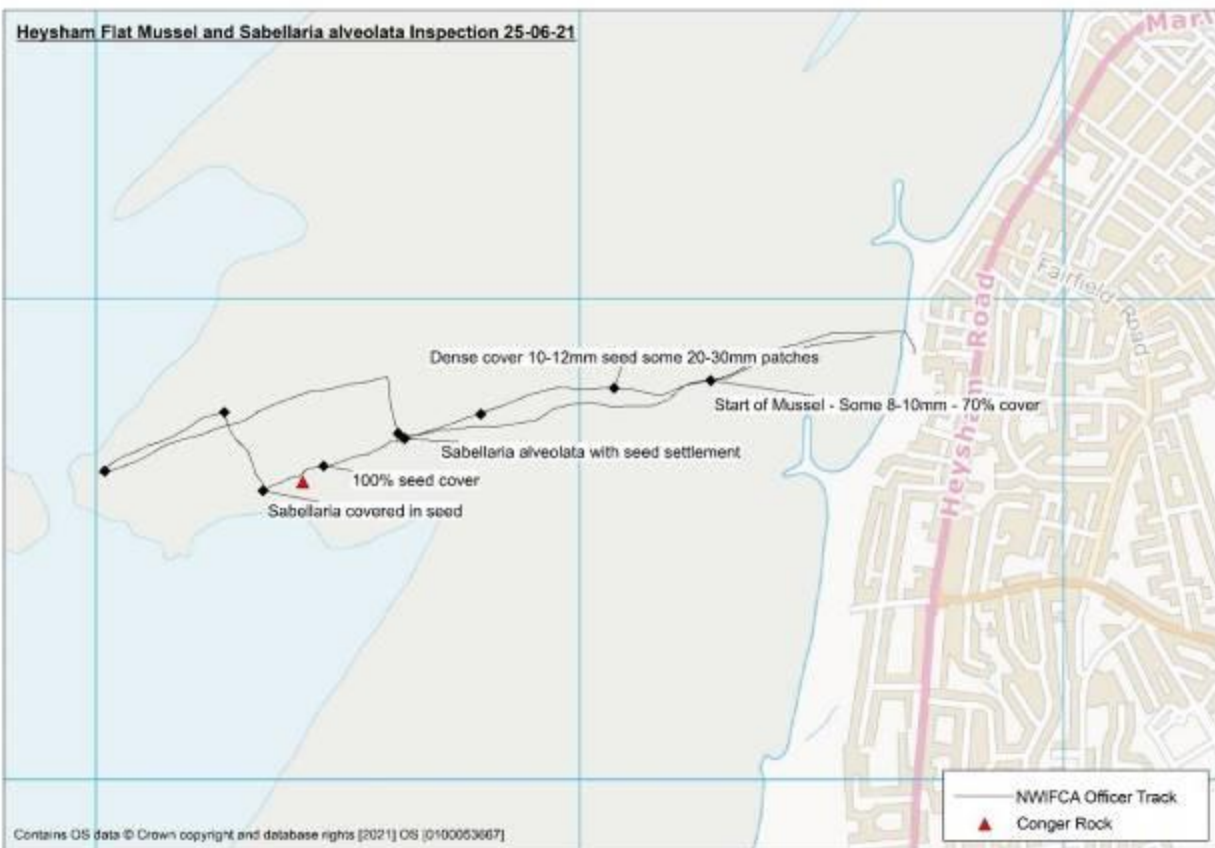


Fig.1 Map of Heysham Flat and approximate extent of *Sabellaria alveolata* 25-06-21.



Fig.2 2021 Mussel settlement 25-06-21.



Fig.3 2021 Mussel settlement 25-06-21.



Fig.4 *Sabellaria alveolata* and mussel seed settlement 25-06-21.



Fig.5 2021 Mussel settlement and patch of 20-30mm mussel 25-06-21.

VI. Perch and Black Scar Mussel Inspection 26-07-21

LW: 08:18 0.9m (Liverpool Tides)

Officers accessed Black Scar and Perch Scar by foot.

Black Scar

The mussel on Black Scar was 10-20mm in size and in places showed signs of roping up and clear indications of scour occurring. The mussel had put down mussel mud to depths of approximately 10-20cm but there were also patches of bare cobble and broken shell. Figure 3 illustrates the unembysed mussel becoming loose and putting out byssus threads in an effort to attach to conspecifics for security. The tide and wave action rolls this layer of embysed mussel until the weight and looseness of the underlying mud renders it too unstable to hold on and it gets washed away.

Perch Scar

The mussel on Perch Scar was in the size range of 10-20mm, and was packed into a soft thin layer of mussel mud (10-20cm). The mussel covered approximately 80% of the Scar and the mussel mud was deeper (30-40cm) and softer at the Northern end of the bed.



Fig. 1 - Extent of seed mussel on Black Scar 26-07-21.



Fig 2 – Mussel on Black Scar 26-07-21.



Fig. 3 - Roping up of seed mussel on Black Scar 26-07-21.



Fig. 4 – Example of mussel on Black Scar 26-07-21.



Fig. 5 - Extent of seed mussel on Perch Scar Scar 26-07-21.



Fig. 6 - Mussel on Perch Scar 26-07-21.



Fig 7 – Mussel Mud on Perch Scar 26-07-21.

c) Dee Estuary Mussels

I. West Kirby Mussel Inspection 28-07-21

LW: 09:39 1.4 m (Liverpool Tides)

Officers were able to walk the full perimeter of the mussel bed which covered 7.5 hectares, which is approximately 0.4 hectares smaller than when last surveyed in April 2020. Figure 1 shows the map of the bed.

Overall the density and size of mussel on the bed was slightly higher than in April 2020. The majority of the mussel was between 45-60mm meaning it has remained and grown on since the previous survey (Figures 2 and 3). Only very occasional undersize mussel was present on the bed with a small area of hard in 20-25mm mussel (approximately 10m x 10m) found on the North West edge of the bed (Figure 4). No spat settlement was observed. The substrate was thick mud with a large amount of cockle shell amongst the mussel. A small flock of oyster catchers were seen feeding on the cockle bed area just off the edge of the mussel bed.

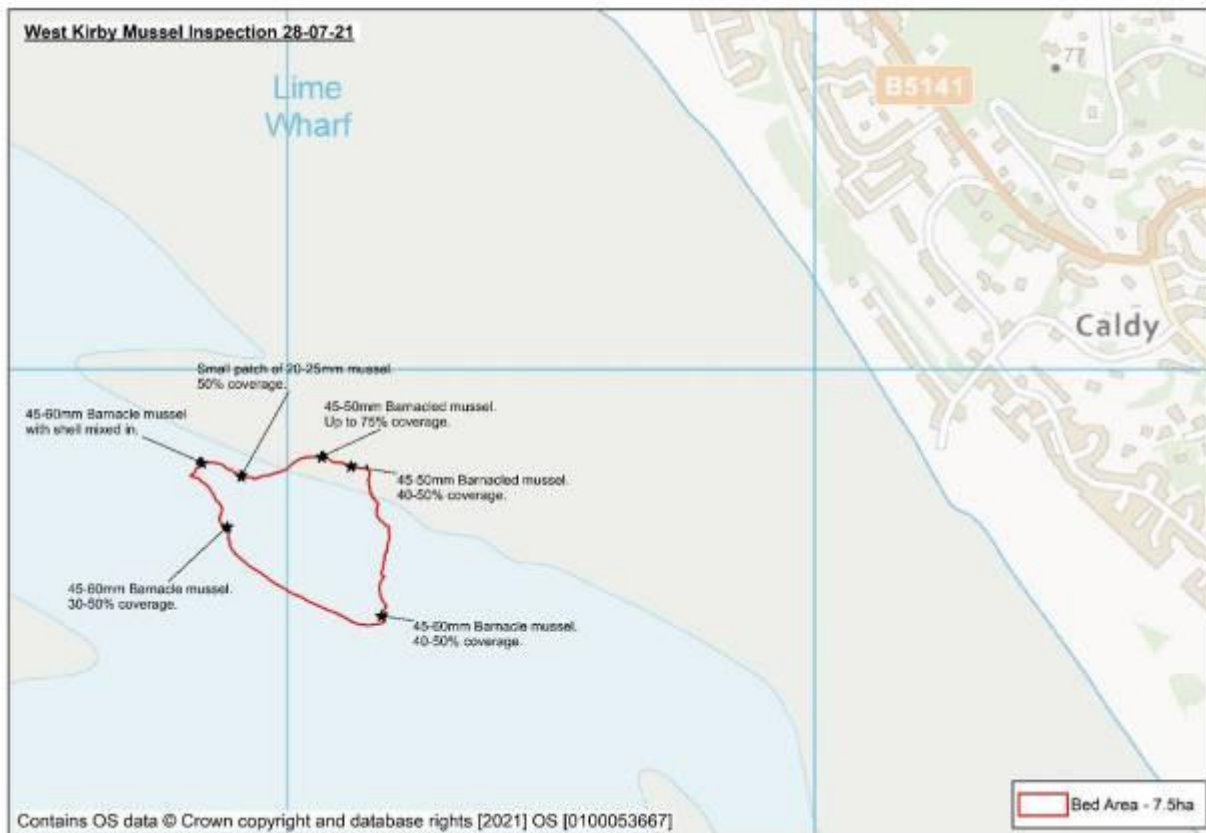


Figure 1. Map showing the area of West Kirby mussel bed 28-07-21



Figure 2. Area of patchier barnacled size mussel on West Kirby 28-07-21



Figure 3. Area of denser 45-60mm barnacled mussel on the South East edge of West Kirby 28-07-21



Figure 4. Area of 20-25mm mussel hard into substrate on West Kirby 28-07-21

II. Thurstaston Mussel Inspection 28-07-21

Low Water: 09:39 1.4m (Liverpool Tides)

Officers were able to walk the full perimeter of the mussel beds Thurstaston with the total of the bed areas being 11.9 ha. The bed area has been mapped in figure 1.

On previous inspections, Thurstaston 1 and 2 have been commented on separately due to the area of Thurstaston 2 being separated from Thurstaston 1 by a channel that officers had not been able to cross. What was referred to as Thurstaston 2 is now a much smaller area that appears to have moved south and is very close to the edge of Thurstaston 1. The two areas are only separated by a small channel that officers were able to cross (Figure 2). From previous reports, Thurstaston 2 touches the North Western edge of the larger bed area from the latest inspection. Therefore, for this report, they will be referred to as one bed area.

Thurstaston 3 was not visible this survey or on the last two surveys indicating the mussel is either covered in mud or no longer present.

In total, the bed area was estimated to be 11.9 ha, made of up one large bed area (11.3 ha) that is separated from a smaller area (0.6 ha) by a narrow channel. The bed had areas of very patchy mussel of <10% coverage up to 40% coverage (Figures 3 & 4). Some areas of low coverage had large amounts of green seaweed growing on the mussel (Figure 5). The majority of mussel was recorded as 40-60mm with a small patch of 10-20mm mussel (Figure 5). No other spat settlement was observed. A large amount of cockle shell was observed amongst the mussel (Figure 6).

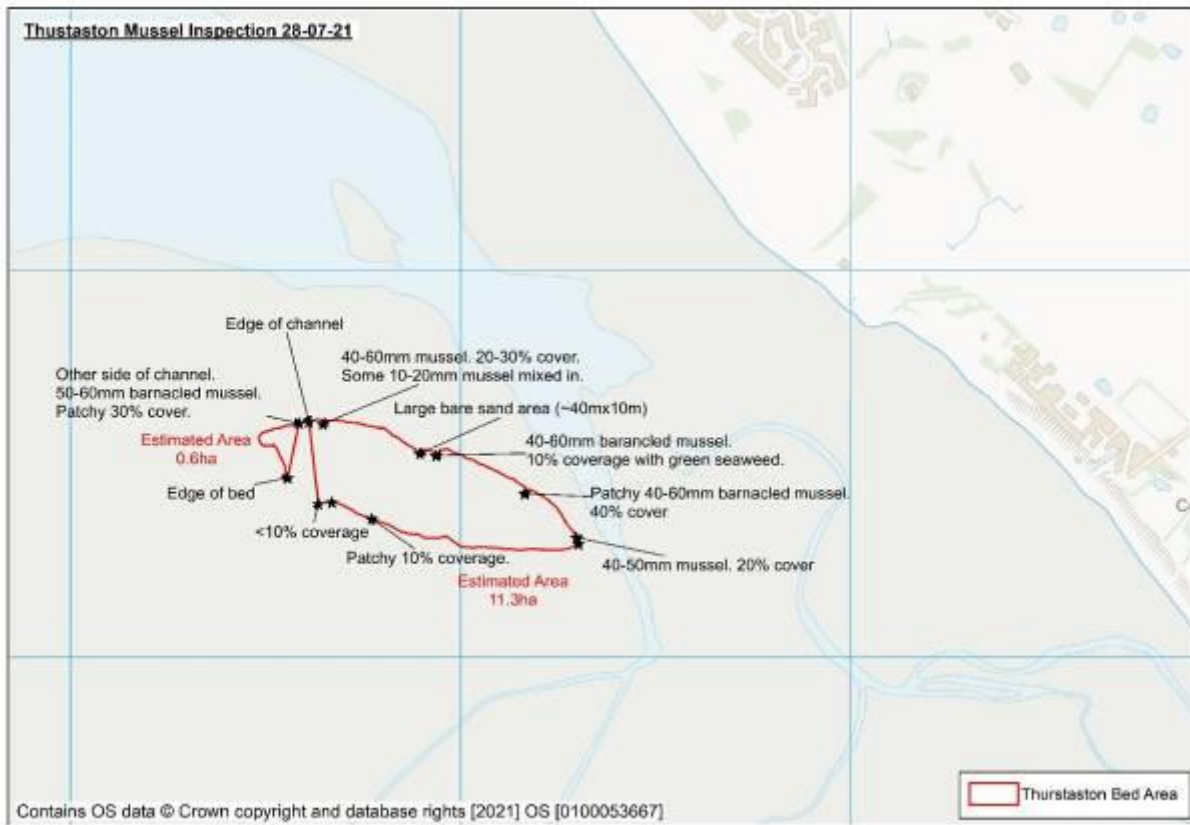


Figure 1. Map showing the area of Thurstaston mussel beds and observations of officers on 28-07-21



Figure 2. The channel separating the bed areas on Thurstaston 28-07-21



Figure 3. Overview of mussel in more dense areas of Thurstaston bed on 28-07-21



Figure 4. Patchy distribution of mussel on Thurstaston 28-07-21



Figure 5. 10-20mm mussel buried in amongst size mussel on Thurstaston bed 28-07-21

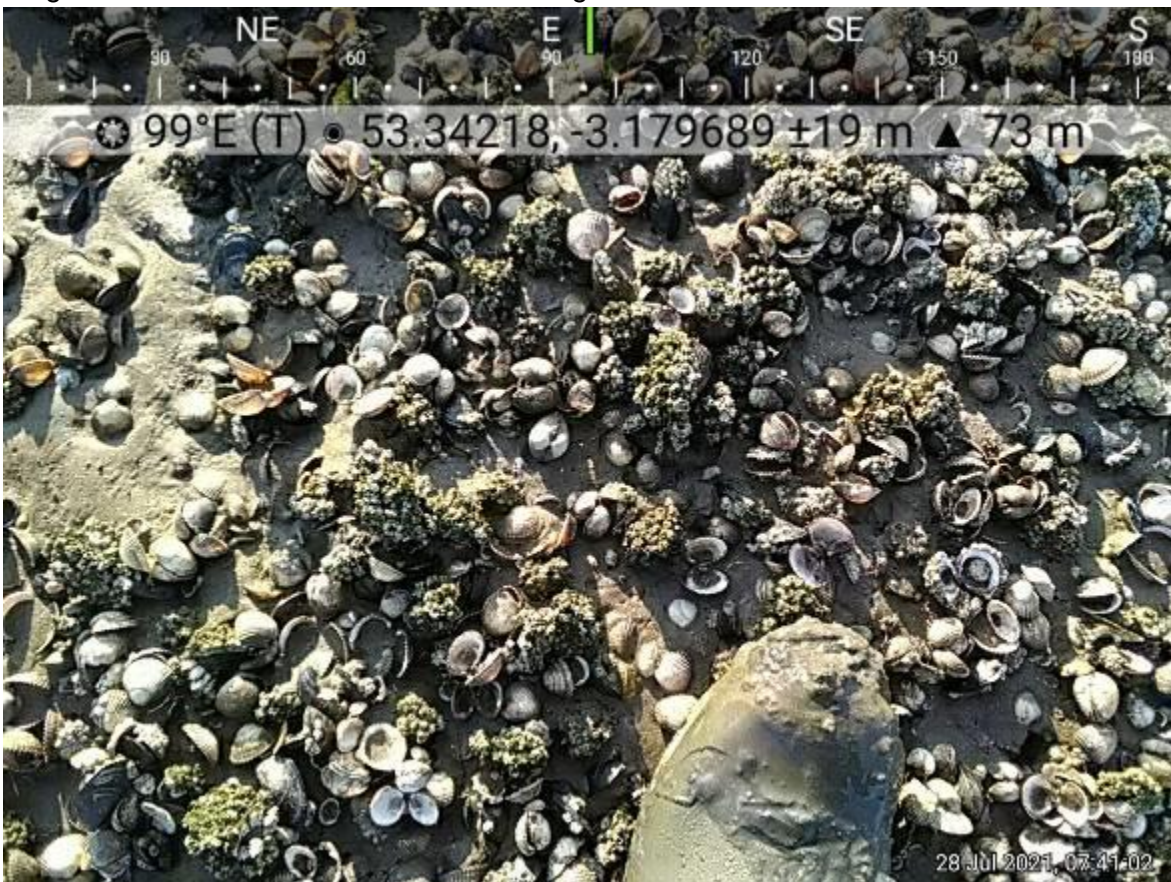


Figure 6. Heavily barnacled mussel with a large amount of cockle shell on Thurstaston 28-07-21